

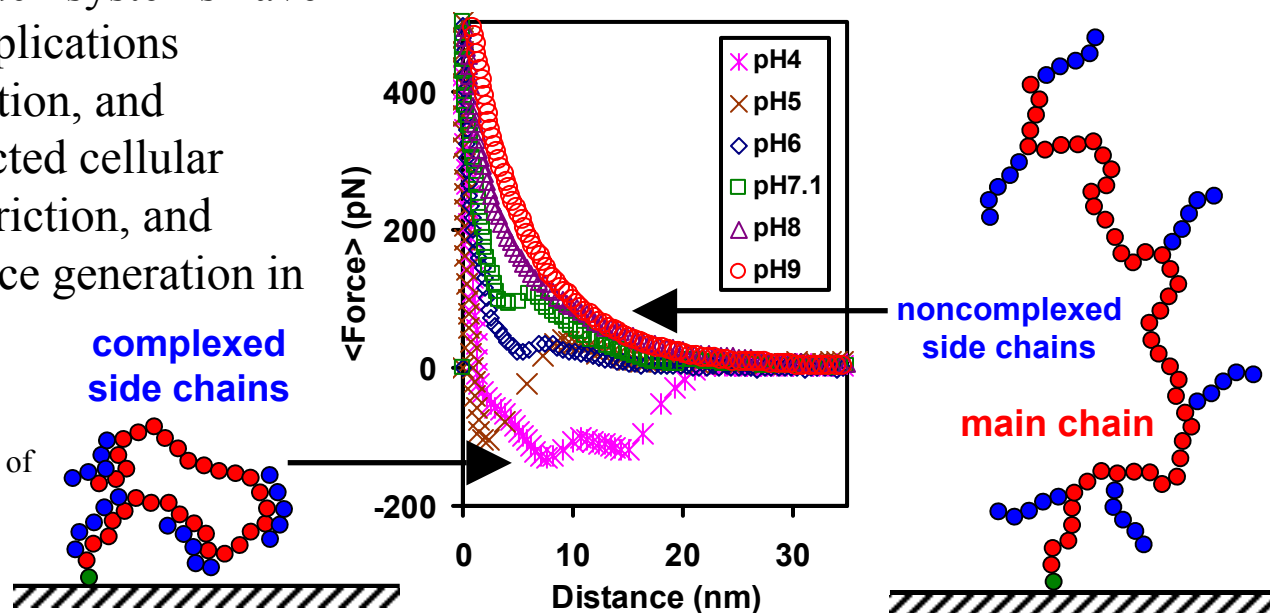
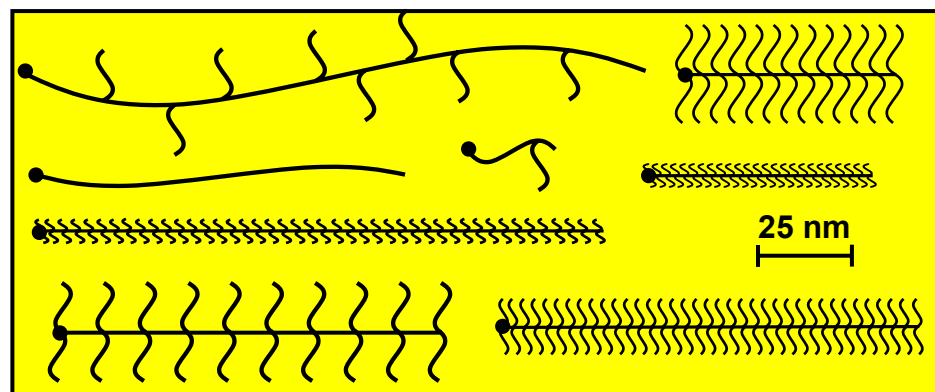
Molecular Design and Nanomechanical Testing of Stimulus-Responsive Side-Chain Graft Copolymer Single Molecules and Brushes of Varying Architecture

Christine Ortiz, MIT, DMR-0094194

In this research program, a variety of novel water soluble, side-chain graft copolymers have been synthesized, for example; thiol-terminated poly(2-hydroxyethyl methacrylate-g-ethylene glycol) and (stimulus responsive) poly(methacrylic acid-g-ethylene glycol). The end-functional group has been employed for attachment to surfaces at low densities (for single molecule nanomechanical testing), as well as high density brushes. Such systems have great promise in a variety of applications including, e.g. transport, separation, and detection of biomolecules, directed cellular function, controlled adhesion, friction, and lubrication in microfluidics, force generation in nanoscale devices, etc

Synthesis, preparation, and nanomechanical testing of stimulus-responsive polymer brushes of poly(methacrylic acid-g-ethylene glycol), *in preparation 2004*.

(Mono)end-functionalized poly(2-hydroxyethyl methacrylate-g-ethylene glycol) graft copolymers of varying macromolecular architecture : 1) *Macromolecules* 2004, 2) *Macromolecules*, *in press* 2004, and (3) *Macromolecules*, *submitted* 2004.



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Education:

Under this grant, one postdoctoral scientist was trained, Dr. Dong Zhang (currently at Epotek), two doctoral students are currently being funded (Miao Ye, Jae Choi), one undergraduate completed her B.S. thesis in this area (Elissa Robbins), another REU student (Celia Macias) who is listed on one publication funded by this grant. Although not being funded by this grant, another graduate student (Lin Han) is also involved in these projects.



Outreach:

Two examples of recent outreach are as follows :

- 1) The PI has been an active participant and lecturer in the **MITE²S** program (Minority Introduction to Engineering, Entrepreneurship, and Science) which is a rigorous six-week residential, academic enrichment summer program for promising high school juniors who are interested in studying and exploring careers in science, engineering, and entrepreneurship.
- 2) The PI and her students also participated in a K-6 teacher video project "*Essential Science for Teachers - Physical Science - Session 8 -Extending the Particle Model*" produced by the Harvard-Smithsonian Center for Astrophysics. This program reaches 67,000 teachers or about 2/3 of all the elementary schools in the U.S. via the Annenberg CPB Channel which is a free satellite channel for schools, colleges, libraries, public broadcasting stations, public access channels, and other community agencies.

